

Appl. No. 10/003,908
Amdt dated August 13, 2004
Reply to Office Action of May 19, 2004.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listings of Claims:

Claim 1: (currently amended) A method of operating a deposition process chamber, the method comprising:

placing a substrate in said process chamber;

depositing a film on said substrate, said depositing leaving a deposition residue on an interior surface of said chamber; and

cleaning said deposition residue from said interior surface by creating a fluorine-containing plasma in said chamber, said fluorine-containing plasma leaving a fluorine-containing contaminant on said interior surface; and thereafter removing said fluorine-containing contaminant by

supplying an oxygen-containing gas into the process chamber;

supplying a hydrogen-containing gas into the process chamber, said hydrogen-containing gas being different from said oxygen-containing gas;

producing a plasma comprising of a mixture of the oxygen-containing gas and the hydrogen-containing gas, thereby exothermically producing H₂O;

causing so that the plasma to react reacts with the fluorine-containing contaminant to form a fluorine-containing material; and

removing the fluorine-containing material from the process chamber.

Claim 2: (previously presented) The method of claim 1, wherein the hydrogen-containing gas is selected from a group consisting of NH₃ and H₂.

Claim 3: (previously presented) The method of claim 1, wherein the oxygen-containing gas is selected from a group consisting of N₂O, O₂ and air.

Claim 4: (canceled)

Claim 5: (previously presented) The method of claim 1, wherein producing the plasma produces an ion flux to an interior surface of the process chamber, so that the ion

SILICON VALLEY
PATENT GROUP LLP

30 Mission College Blvd
Suite 300
Santa Clara, CA 95051
(408) 982-8200
FAX (408) 982-8210

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flux results in an ion-enhanced chemical reaction between the plasma and the fluorine-containing contaminant.

Claim 6: (previously presented) The method of claim 1, wherein producing the plasma generates a plurality of coordinately and electronically unsaturated radicals and ions that react with the fluorine-containing contaminant.

Claim 7: (original) The method of claim 1, wherein the mixture of the oxygen-containing gas and the hydrogen-containing gas is 70 mol % N_2O/NH_3 .

Claim 8: (original) The method of claim 7, wherein a flow rate of NH_3 into the process chamber is 1,500 sccm.

Claim 9: (original) The method of claim 7, wherein a flow rate of N_2O into the process chamber is 3,500 sccm or less.

Claim 10: (original) The method of claim 7, wherein producing the plasma uses a high frequency RF power of 3,000W, and a pressure of the process chamber is 2 Torr.

Claim 11: (original) The method of claim 1, wherein the mixture of the oxygen-containing gas and the-hydrogen containing gas is 50 mol % N_2O/NH_3 .

Claim 12: (original) The method of claim 11, wherein a flow rate of NH_3 into the process chamber is 1,500 sccm.

Claim 13: (original) The method of claim 11, wherein a flow rate of the N_2O into the process chamber is 3,500 sccm or less.

Claim 14: (original) The method of claim 11, wherein producing the plasma uses a high frequency RF power of 3,000W, and a pressure of the process chamber is 2 Torr.

Claim 15: (original) The method of claim 1, wherein the mixture of the oxygen-containing gas and the-hydrogen containing gas is 52 mol % O_2/NH_3 .

Claim 16: (original) The method of claim 15, wherein a flow rate of NH_3 into the process chamber is 2,000 sccm.

Claim 17: (original) The method of claim 15, wherein a flow rate of the N_2O into the process chamber is 2,170 sccm or less.

SILICON VALLEY
PATENT GROUP LLP
50 Mission College Blvd
Suite 500
Santa Clara, CA 95054
(408) 982-8200
FAX (408) 982-8210

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Claim 18: (original) The method of claim 15, wherein producing the plasma uses a high frequency RF power of 2,000W, and a pressure of the process chamber is 3 Torr.

Claim 19: (original) The method of claim 1, further comprising supplying an inert gas to stabilize the plasma.

Claim 20: (original) The method of claim 19, wherein the inert gas is selected from a group consisting of He, Ne, Ar, and Kr.

Claim 21: (original) The method of claim 1, wherein the process chamber is a chemical vapor deposition chamber.

Claim 22: (previously presented) The method of Claim 1 wherein the fluorine-containing material is a fluorine-containing gas.

Claim 23: (previously presented) The method of Claim 1 wherein the hydrogen-containing gas is NH_3 and the fluorine-containing material comprises an ammonium fluoride.

Claim 24: (currently amended) A method of operating a deposition process chamber, the method comprising:

placing a substrate in said process chamber;

depositing a film on said substrate, said depositing leaving a deposition residue on an interior surface of said chamber; and

cleaning said deposition residue from said interior surface by creating a fluorine-containing plasma in said chamber, said fluorine-containing plasma leaving a fluorine-containing contaminant on said interior surface; and thereafter removing said fluorine-containing contaminant by

creating a plasma that generates H_2O and heat in said process chamber, said plasma H_2O reacting with the fluorine-containing contaminant in the presence of said heat to form a fluorine-containing material; and

removing the fluorine-containing material from the process chamber.

Claim 25: (previously presented) The method of Claim 24 wherein the fluorine-containing material is a fluorine-containing gas.

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Claim 26: (previously presented) The method of Claim 24 wherein the hydrogen-containing gas is NH_3 and the fluorine-containing material comprises an ammonium fluoride.

SILICON VALLEY
PATENT GROUP LLP
40 Mission College Blvd
Suite 360
Santa Clara, CA 95054
(408) 982-8200
FAX (408) 982-8210